

Fiber Optic System
Digital Video Multiplexer
and Digital Video Multiplexer
with Multiprotocol Data
Model 99xxV and 99xxVMPD

installation instructions



GENERAL

This manual is a guide to the installation and operation of the 9900V and 9900VMPD series fiber optic video multiplexers. Please read the entire manual before installing the equipment.

NOTE: The series numbers 9900V-T and 9900V-R are used to describe all models of transmitters and receivers unless noted otherwise.

A 9900V link supports from 2 to 20 video channels while the 9900VMPD link supports from 2 to 40 video channels and one channel of two-way multi-protocol data. Systems supporting up to 10 video channels consist of a single 1-RU (rack unit) module at each end.

Systems supporting from 12 to 40 video channels consist of multiple interconnected 1-RU transmitters or receivers at each end.

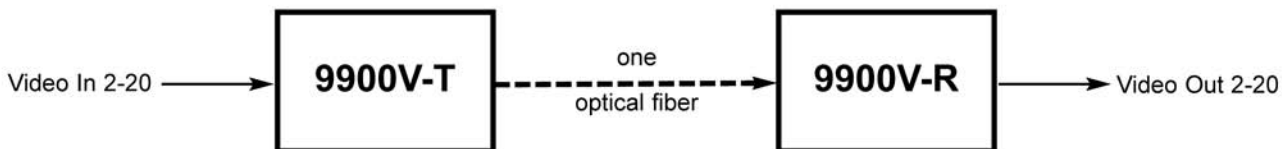
Unpacking the Unit

In the event that anything is missing from the following list, contact your authorized Fiber Options dealer or representative.

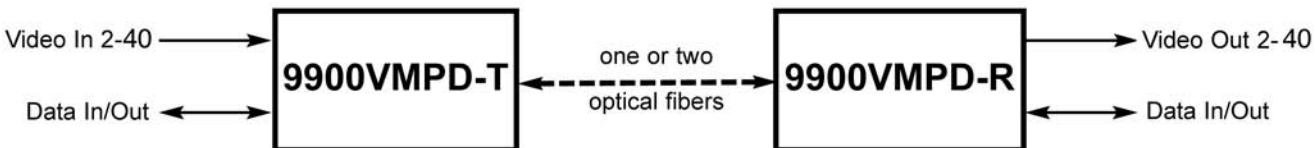
- 9900V-T Transmitter or 9900V-R Receiver
- (9900VMPD-T Transmitter or 9900VMPD-R Receiver)
- AC power cord
- Model 613P Power Supply
- 2 Mounting Brackets
- 4 Screws for securing brackets to unit
- 4 Rubber feet for desktop installation
- Fiber Jumpers (9912V-9940V Only)
- Instruction manual

Save the original packing materials in case it becomes necessary to return the unit.

SYSTEM DIAGRAM 9900V AND 9900VL MODELS



SYSTEM DIAGRAM 9900VMPD MODELS



LASER SAFETY

CAUTION: Class I Laser Product. Invisible Radiation at Aperture. Avoid Exposure to Beam.

Although this is a Class I laser product, which is not considered hazardous, keep in mind that the beam is invisible. For your further protection we suggest that you:

1. Do not turn on any transmitter unit unless both ends of the fiber are connected.
2. Never look into the fiber optic connector on the back of any unit when the unit is turned on.
3. Never look directly at the end of the fiber optic cable when the unit is turned on.
4. Do not aim activated fiber optic cable ends at reflective surfaces or other persons.

MODULE SETUP

General

Before installing the 9900VMPD-T or 9900VMPD-R units, determine the data formats required for input and output. Data selection does not apply to the 9900V units.

Data Selection

NOTE: The DATA SELECT switch is shipped in the Disabled setting.

Using the rotary DATA SELECT switch, select a valid data format according to the DATA SELECT settings shown in Figure 1. See Figures 2 through 5 for the location of the DATA SELECT switch.

INSTALLATION

Installation Considerations

This fiber-optic link is supplied as a standalone unit or as a rack unit. Units should be installed in dry locations protected from extremes of temperature and humidity. See Figure 6 for unit dimensions.

You may select any one of three methods of installation, depending upon the conditions and limitations of the site. The

9900V series units may be installed in a standard 19-inch rack, as a desktop unit, or as a wall-mounted unit.

In all cases, after selecting the method of installation and the location, verify that there is enough space to pull and connect all cables without stressing them beyond the manufacturer's minimum bend radius limitation. Also consider future accessibility issues when selecting the location.

Rack-Mount Installation

Follow these guidelines for rack-mount installation:

1. Using the 4 screws provided, attach the rack-mount tabs to the 9900V. Locate the vertically aligned mounting holes on the left and right sides of the unit and position the round screw-holes on the tabs over them. Be sure that the oblong screw-holes on the tabs are facing forward and that the tabs are flush with the front bezel of the unit.
2. Attach each tab with 2 screws. Do not over-tighten the screws.
3. At this point, the 9900V is ready to mount in a standard 19-inch EIA rack, using appropriate screws.
4. Fasten the 9900V to the rack securely, again being sure not to overtighten the screws.

When installing more than one 9900V in a rack or in a rack that is partially populated with other equipment, be sure to provide adequate ventilation between the units. A minimum of 1 RU (1.75 inches) is recommended for air flow

Desktop Installation

Follow these guidelines for desktop installation:

1. Place the 9900V upside-down on a flat surface being careful not to scratch the surface of the unit. Wipe the bottom of the 9900V with a soft, dry cloth to remove any dust or dirt.
2. Remove the backing from the provided rubber feet and attach them to the bottom of the 9900V, placing them approximately 1 inch from each corner of the unit. Press firmly to ensure a good bond.
3. Turn the 9900V over and place it on the desk-top.

If more than one 9900V is to be installed, repeat the above process. The 9900V units may be stacked one on top of another, but should not be stacked higher than 4 units for stability.

FIGURE 1: DATA SELECT SWITCH SETTINGS

Setting	Mode	Setting	Mode
0	Disable (factory preset)	8	RS-485 2-wire 2V
1	RS-232 (3-wire)	9	RS-485 4-wire standard
2	RS-232 + handshake	A	RS-485 4-wire 1V
3	TTL	B	RS-485 4-wire 2V
4	RS-422 2-wire	C	Reserved
5	Manchester/Biphase	D	Reserved
6	RS-485 2-wire standard	E	Reserved
7	RS-485 2-wire 1V	F	Test Mode

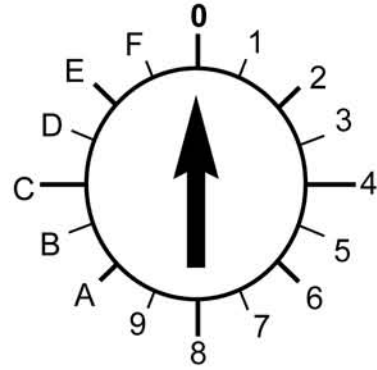


FIGURE 2: 2-FIBER 9900VMPD TRANSMITTER REAR PANEL

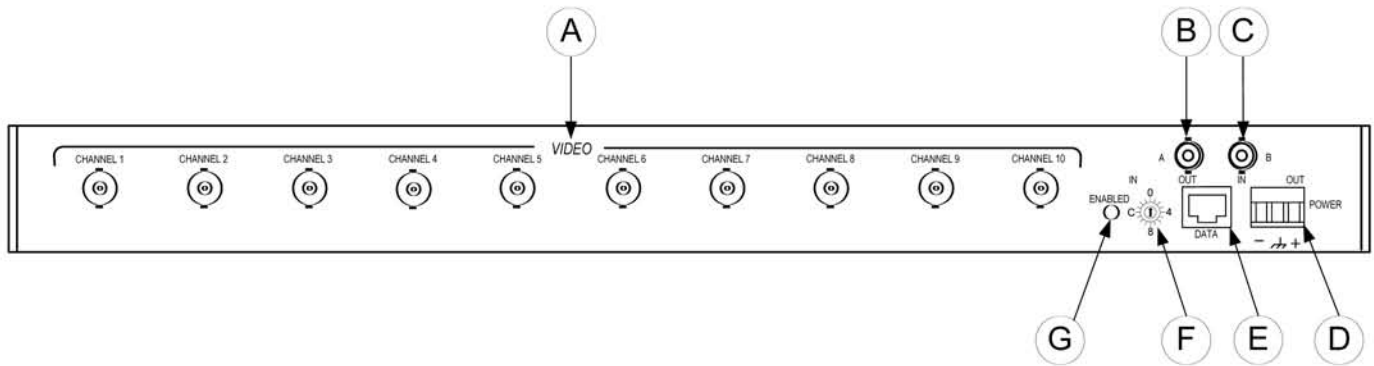


FIGURE 3: 1-FIBER 9900V AND 9900VMPD TRANSMITTER REAR PANEL

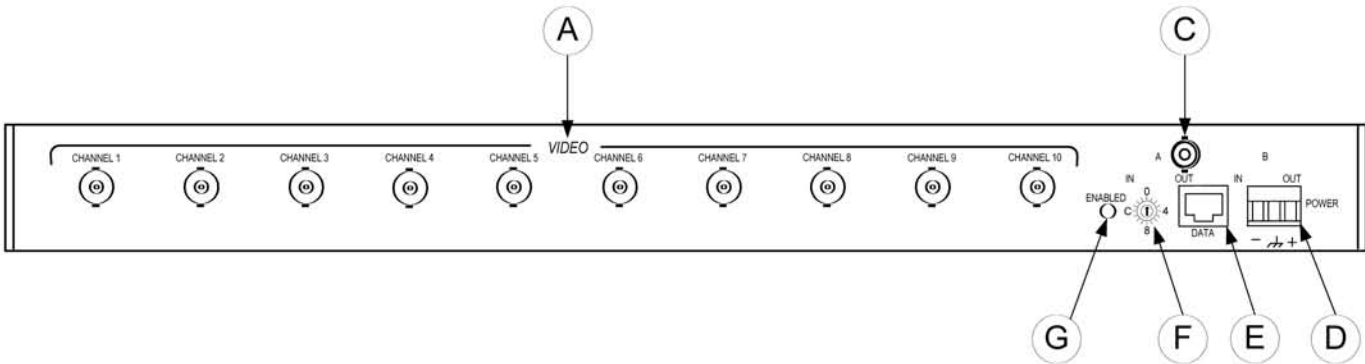


TABLE 1: LEGEND FOR FIGURES 2 AND 3

Item	Description
A	Video Input Channel 1 - 10 BNC Connectors
B	Optical (Fiber) TRANSMIT Connector
C	Optical (Fiber) RECEIVE Connector / Tx, Rx connector (single fiber VMPD units)
D	Power Connector
E	Data Connector (used on 9900VMPD units only)
F	Data Select Switch (used on 9900VMPD units only)
G	ENABLED LED

FIGURE 4: 2-FIBER 9900VMPD RECEIVER REAR PANEL

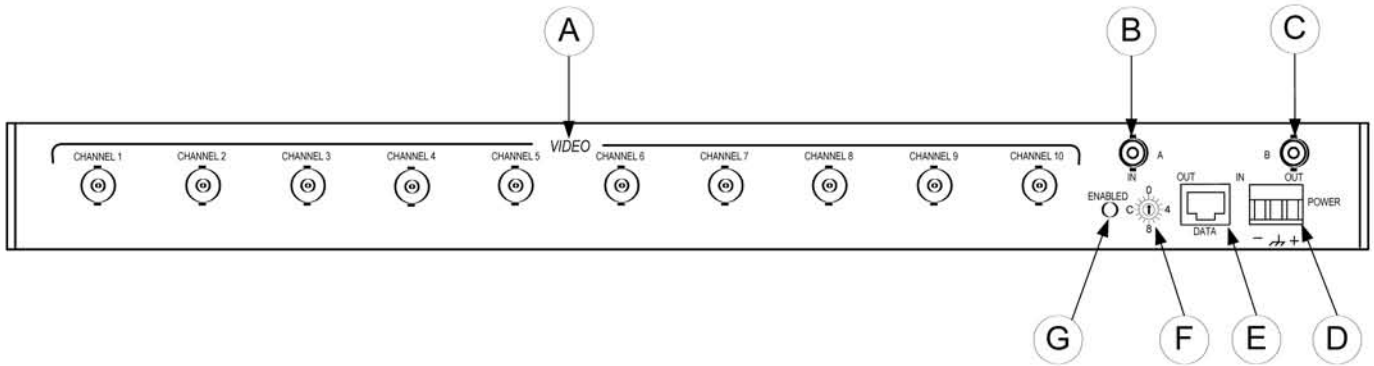


FIGURE 5: 1-FIBER 9900V AND 9900VMPD RECEIVER REAR PANEL

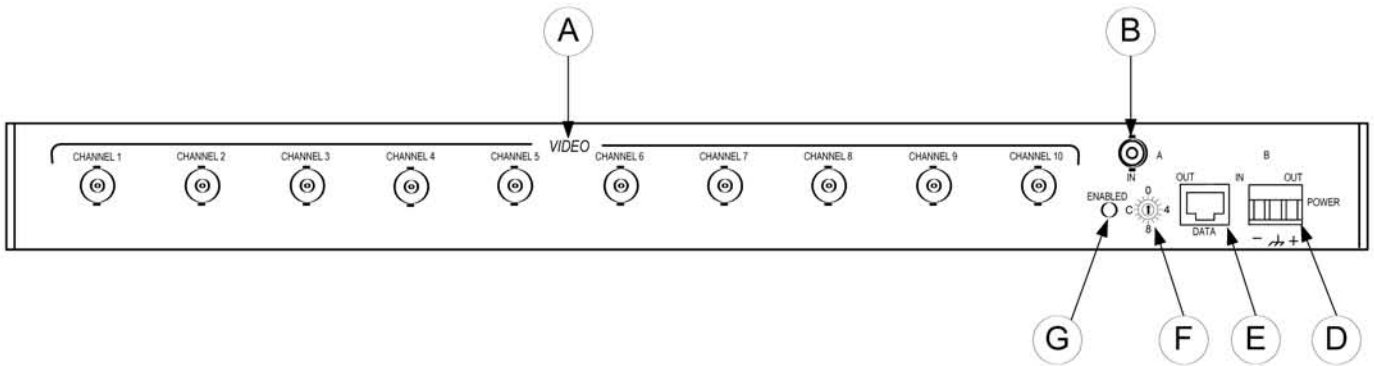
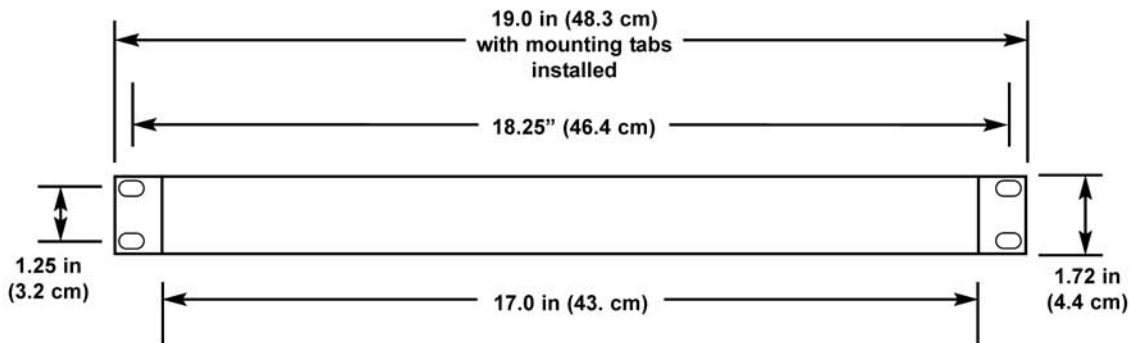


TABLE 2: LEGEND FOR FIGURES 4 AND 5

Item	Description
A	Video Output Channel 1 - 10 BNC Connectors
B	Optical (Fiber) RECEIVE Connector
C	Optical (Fiber) TRANSMIT Connector / Tx, Rx connector (single fiber VMPD units)
D	Power Connector
E	Data Connector (used on 9900VMPD units only)
F	Data Select Switch (used on 9900VMPD units only)
G	ENABLED LED

FIGURE 6: 9900V SERIES DIMENSIONS (ALL UNITS)



Note: Depth of all 9900V units = 11.7 inches (29.7 cm) including panel-mounted BNC connectors.

Wall-Mount Installation

Follow these guidelines for wall-mount installation:

1. Select the area on the wall where the 9900V will be installed and determine where the power supply will be located. Be sure that both an a/c power source and the 9900V will be within reach of the power supply.
2. Verify that there will be no excessive strain on the power connection at the 9900V. It is also recommended that the unit be mounted in such a way that the LED indicators will all be readily visible.
3. Locate the mounting holes on the left and right sides of the unit, 2 sets of 2 horizontally aligned holes on each side. Position the round screw-holes on the tabs over the mounting holes on the 9900V, being sure that the oblong screw-holes are flush with the bottom of the unit.
4. Attach each tab securely to the 9900V with 2 screws, but do not over-tighten the screws. See Figure 7.
5. Mount the 9900V to the wall, using 4 screws suitable for fastening to the selected surface. Use screws that are sufficiently long to provide secure mounting to the wall.

CONNECTIONS

Data Connections

The 9900VMPD models support RS-232, RS-442, RS-485, TTL, Manchester, SensorNet™, and Biphase data formats.

Data connections are made to the RJ-45 connector on the 9900VMPD rear panel according to the selected format. Refer to Tables 3 through 11. When connecting data cables, always wire the DATA OUT pins on the data equipment to the DATA IN pins on the fiber links, and the DATA IN pins on the data equipment to the DATA OUT pins on the fiber links. See Figure 8.

Data connections are wired to a male RJ-45 plug which is then inserted into the corresponding RJ-45 socket on the rear of the 9900VMPD unit. See Figure 9.

Data Cable Adapter

A data cable adapter is provided with the 9900VMPD models for use in installations where RJ-45 cable connections cannot be provided or are not feasible to install. The adapter consists of a prefabricated RJ-45 data cable and an eight-screw terminal RJ-45 block. See Figure 10.

Connection to the terminal block must be made according to Tables 3 through 11 for the selected data type.

1. Strip sufficient insulation from the data cable to expose the wires inside.
2. Strip one half-inch of insulation from the exposed wires.

Note: Be certain that there is no insulation material on the wires that could prevent good contact to the screw posts.

3. Remove the cover from the terminal block. Loosen the screws on the terminal block as needed for the selected data type. Refer to the Tables 3 through 11.

FIGURE 7: LOCATION OF BRACKETS FOR WALL MOUNTING

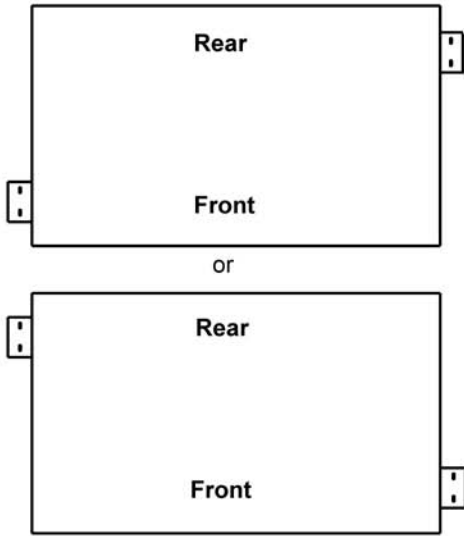


FIGURE 8: FIBER LINK DATA CONNECTIONS

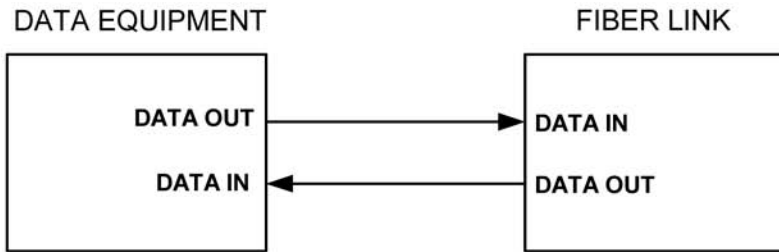


FIGURE 9: RJ-45 SOCKET (VIEWED FROM THE REAR OF THE UNIT)

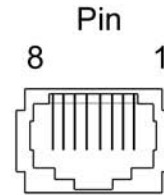
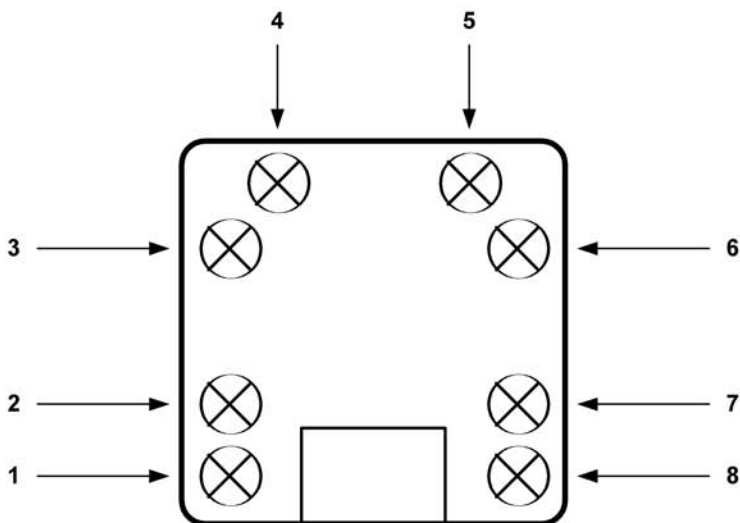


FIGURE 10: TERMINAL BLOCK PIN ASSIGNMENTS



NOTE: When making data connections listed in Tables 3 through 11, always connect the pins labeled IN on the fiber unit to the pins labeled OUT on the external equipment, and the pins labeled IN on the external equipment to the pins labeled OUT on the fiber unit.

TABLE 3: RS-232 INTERFACE

DATA SELECT Switch: Position 1

Pin	Signal
1	GROUND/SHIELD
2	RS-232 OUT
3	NO CONNECTION
4	NO CONNECTION
5	RS-232 IN
6	NO CONNECTION
7	NO CONNECTION
8	GROUND

TABLE 4: RS-232 WITH HANDSHAKING INTERFACE

DATA SELECT Switch: Position 2

Pin	Signal
1	GROUND/SHIELD
2	RS-232 OUT
3	RTS/CTS OUT
4	NO CONNECTION
5	RS-232 IN
6	RTS/CTS IN
7	NO CONNECTION
8	GROUND

TABLE 5: TTL INTERFACE

DATA SELECT Switch: Position 3

Pin	Signal
1	GROUND/SHIELD
2	NO CONNECTION
3	TTL OUT
4	NO CONNECTION
5	TIE TO PIN 1
6	TTL IN
7	NO CONNECTION
8	GROUND

TABLE 6: RS-422 INTERFACE

DATA SELECT Switch: Position 4

Pin	Signal
1	GROUND/SHIELD
2	RS-422 OUT -
3	RS-422 OUT +
4	NO CONNECTION
5	RS-422 IN -
6	RS-422 IN +
7	NO CONNECTION
8	GROUND

TABLE 7: MANCHESTER/BIPHASE INTERFACE

DATA SELECT Switch: Position 5

Pin	Signal
1	MANCHESTER/BIPHASE OUT -
2	MANCHESTER/BIPHASE OUT +
3	NO CONNECTION
4	NO CONNECTION
5	MANCHESTER/BIPHASE IN -
6	MANCHESTER/BIPHASE IN +
7	NO CONNECTION
8	GROUND

**TABLE 8: MANCHESTER/BIPHASE INTERFACE
TERMINATION UNIT**

DATA SELECT Switch: Position 5

Pin	Signal
1	MANCHESTER/BIPHASE OUT -
2	MANCHESTER/BIPHASE OUT +
3	NO CONNECTION
4	NO CONNECTION
5	MANCHESTER/BIPHASE IN -
6	MANCHESTER/BIPHASE IN +
7	TERMINATION - TIE TO PIN 5
8	GROUND

TABLE 9: RS-485 2-WIRE INTERFACE/ SENSORNET

DATA SELECT Switch SW1:

- Position 6 = standard offset
- Position 7 = 1V offset
- Position 8 = 2V offset

Pin	Signal
1	GROUND/SHIELD
2	NO CONNECTION
3	NO CONNECTION
4	+5 VDC BIAS OUT
5	RS-485 -
6	RS-485 +
7	TERMINATION – TIE TO PIN 5
8	GROUND

TABLE 10: RS-485 4-WIRE INTERFACE

DATA SELECT Switch SW1:

- Position 9 = standard offset
- Position A = 1V offset
- Position B = 2V offset

Pin	Signal
1	GROUND/SHIELD
2	RS-485 OUT -
3	RS-485 OUT +
4	+5 VDC BIAS OUT
5	RS-485 IN -
6	RS-485 IN +
7	TERMINATION – TIE TO PIN 5
8	GROUND

TABLE 11: SENSORNET INTERFACE

DATA SELECT Switch: Position 6

Pin	Signal
1	GROUND/SHIELD
2	NO CONNECTION
3	NO CONNECTION
4	+5 VDC BIAS OUT
5	SENSORNET -
6	SENSORNET +
7	TERMINATION – TIE TO PIN 5
8	GROUND

TABLE 12: TEST MODE LOOPBACK INTERFACE

DATA SELECT Switch: Position F

Pin	Signal
1	NO CONNECTION
2	TIE TO PIN 5
3	TIE TO PIN 6
4	NO CONNECTION
5	TIE TO PIN 2
6	TIE TO PIN 3
7	NO CONNECTION
8	GROUND

4. Wrap the stripped wires around the correct screws in a clockwise direction and tighten the screws.
5. Replace the cover on the terminal block.
6. Attach the prefabricated RJ-45 cable to the terminal block and to the 9900VMPD unit.

Power Connections

The 9900V series units are supplied with an external DC power supply, Model 613P. A permanently attached cable is provided for the DC output and a detachable two-wire cable is provided for AC input.

CAUTION: Do not connect the unit to an AC power source until directed to do so.

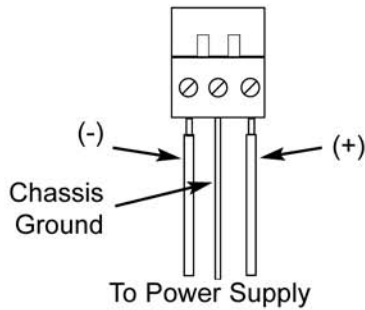
1. Remove the detachable screw terminal power connector from the back of the 9900V unit.
2. The external 613P power supply has a pendant cable with two tinned leads. Connect these leads to the power connector as shown in Figure 11.
3. Verify that the power supply is not connected to a wall outlet, and insert the detached power connector into its socket on the back of the 9900V unit.

Do not plug the power supply into an AC outlet at this time.

Fiber Optic Cable Connection

Most cable manufacturers identify the individual fibers in the cable. Select appropriately terminated fiber and mark both ends with unique identification label (e.g. for cable no. 03, fiber no. 08) to ensure that the fiber connected to the near end is the same one that is connected to the far end.

**FIGURE 11: DETACHABLE SCREW
TERMINAL POWER CONNECTOR**



The proper optical connection will link the transmitter's TRANSMIT (OUT) port to the receiver's RECEIVE (IN) port. See Figures 2 through 5.

1. Wipe the inside of the port's sleeve with a lint-free pipe cleaner moistened with reagent-grade isopropyl alcohol. Blow dry with dry air.
2. Clean the connector using a lint-free cloth dampened with alcohol to thoroughly wipe the side and end of the ferrule. Blow the ferrule dry with dry air. Visually inspect the ferrule for lint.
3. Fasten the fiber optic cable to the port.

Connecting Channels 12 - 40

Units designed for transmission of more than 10 channels (9912V - 9940V) consist of up to four 1-RU units and a fiber jumper(s) at the transmitter and receiver ends of the link.

At each end of the link, use the fiber jumper(s) provided with the unit to connect the optical ports of the transmitters and receivers. All units should be connected OUT to IN.

The remaining optical port, OUT on the transmitter side or IN on the receiver side, is used to complete the link between the two. See Figures 12a-12c.

Video Cable Connection

CAUTION: Make sure all peripheral equipment to be connected to the fiber units is turned OFF during installation.

Fiber Options suggests that Belden number 9259 or equivalent coaxial cable should be used. Consult the cable manufacturer's specifications for the maximum distance between the video equipment and the fiber equipment.

NOTE: Coaxial cable must be terminated with female BNC connectors to properly couple with the Fiber Options equipment.

1. Connect the video sources, such as cameras, to the input BNC connectors on the 9900V-T transmitter using terminated coaxial cable. See Figures 2 and 3.
2. Connect the monitoring equipment to the output BNC connectors on the 9900V-R receiver using terminated coaxial cable. See Figures 4 and 5.

SMARTS™ DIAGNOSTICS

The 9900V has built in Status Monitoring And Reliability Test System (*SMARTS™*) diagnostic capabilities. This includes LED indicators for monitoring data and optical status. They are described in the following sections.

FIGURE 12a: FIBER CONNECTIONS FOR 9912V1 - 9920V1 and 9912VMPD - 9920VMPD

99XXVMPD1 CONNECTION DIAGRAM

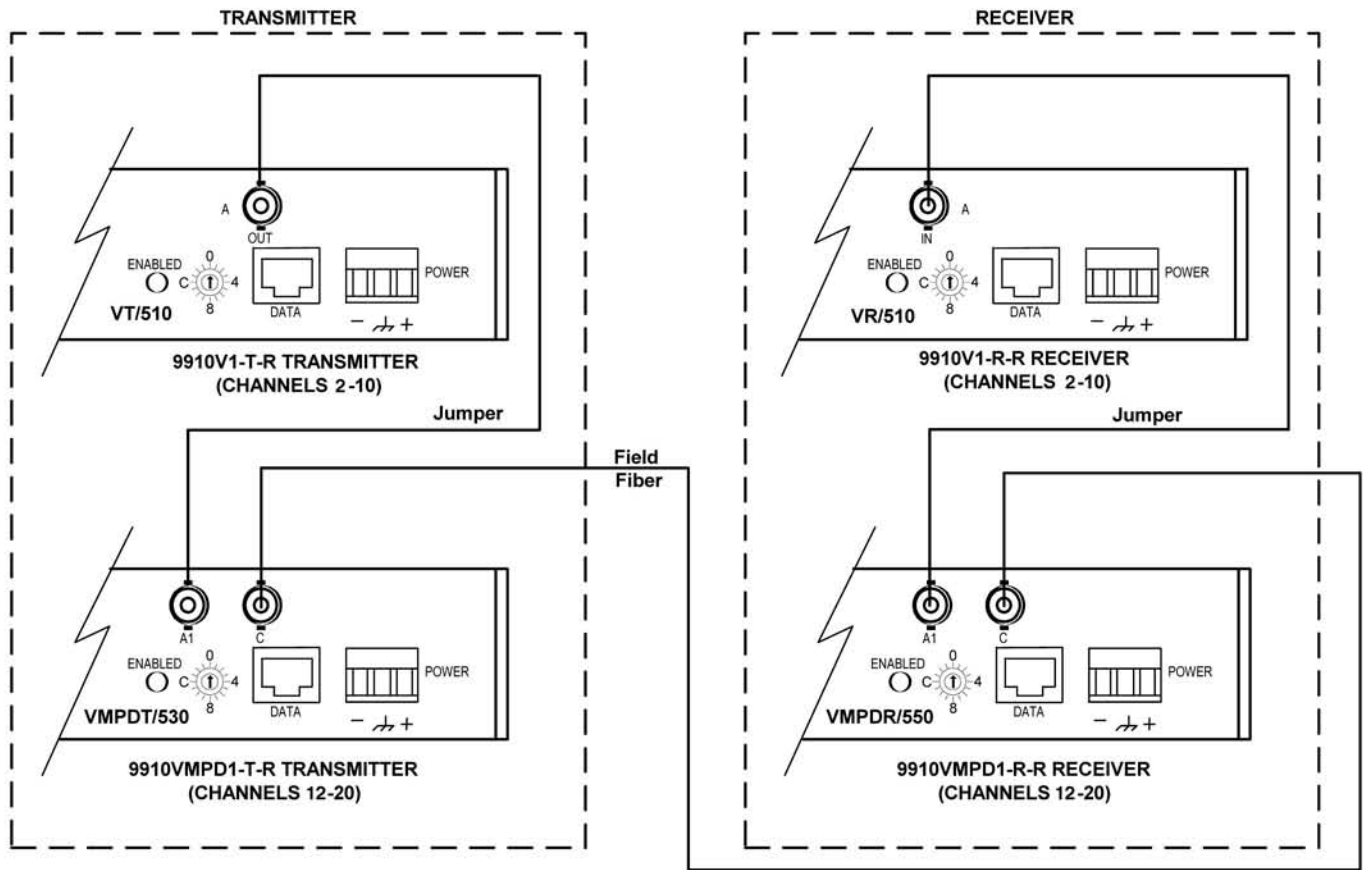


FIGURE 12b: FIBER CONNECTIONS FOR 9922VMPD - 9930VMPD

99XXVMPD1 CONNECTION DIAGRAM

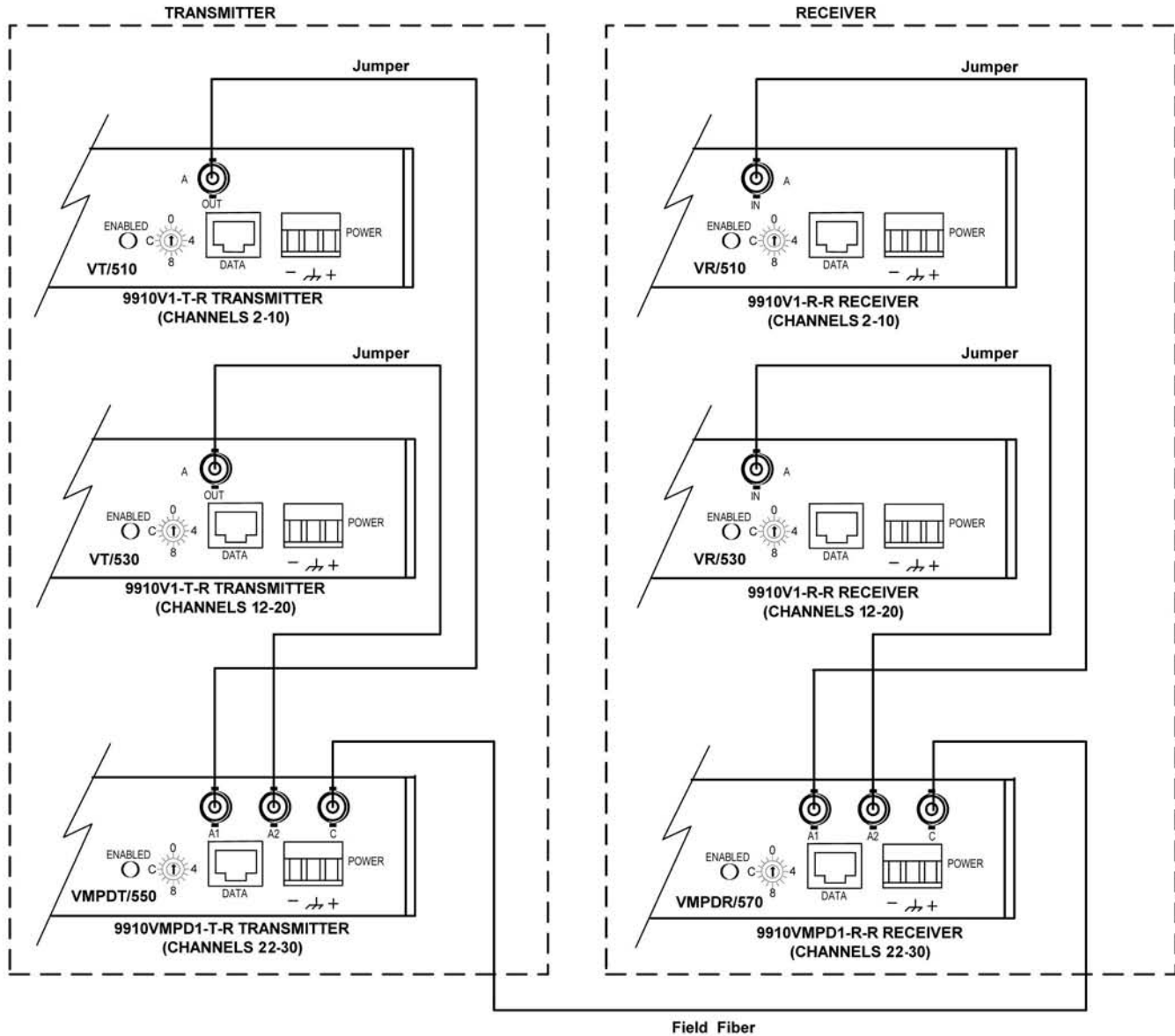


FIGURE 12c: FIBER CONNECTIONS FOR 9932VMPD - 9940VMPD

99XXVMPD1 CONNECTION DIAGRAM

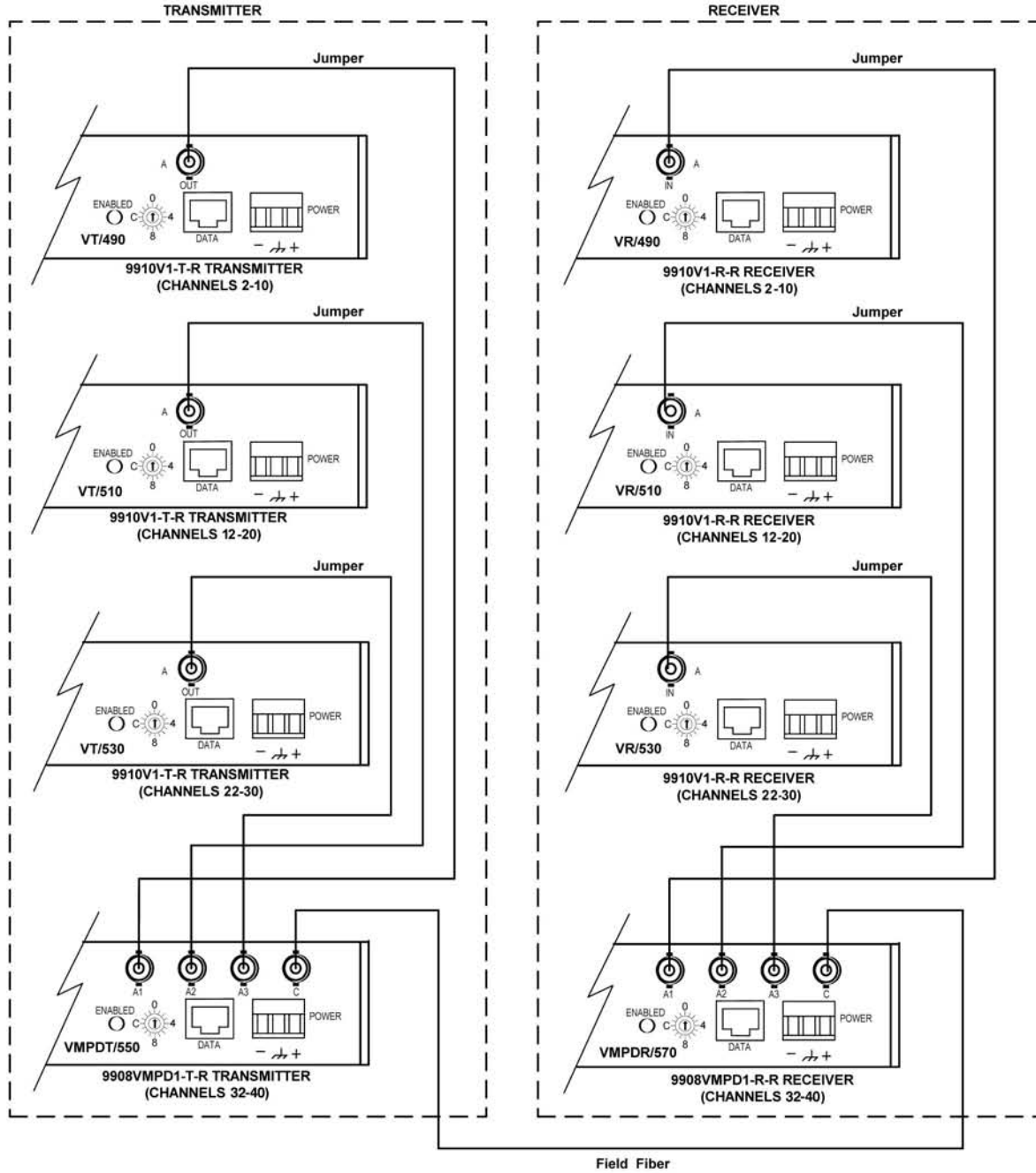


FIGURE 13: 9900V-T TRANSMITTER FRONT PANEL

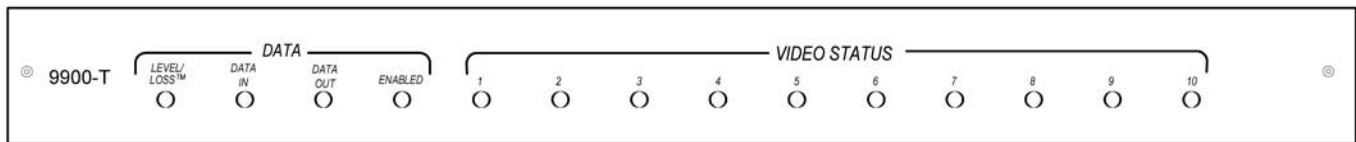


FIGURE 14: 9900V-R RECEIVER

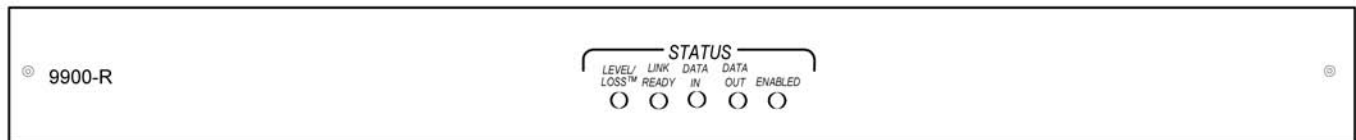


TABLE 13: LED DIAGNOSTIC INDICATORS

LED Name	Color	Indicates/Corrective Action
LEVEL/LOSS	Green	Sufficient optical power received. <i>No action required.</i>
	Red	Insufficient optical power received. <i>Verify fiber connected & within optical budget, receiver power on.</i>
VIDEO IN/OUT	Green	Valid video signal at unit. <i>No action required.</i>
	Red	No video signal at unit. <i>Verify video connected, video source has power and is transmitting.</i>
DATA IN	Green	Logic high into unit. <i>No action required.</i>
	Yellow	Logic low into unit. <i>No action required.</i>
	Off	Tri-state or disabled condition. <i>Verify data connected, data source has power.</i>
DATA OUT	Green	Logic high received over fiber. <i>No action required.</i>
	Yellow	Logic low received over the fiber. <i>No action required.</i>
	Off	Tri-state received over fiber or disabled condition. <i>No action required.</i>
LINK READY	Green	Communication established with transmitter. <i>No action required.</i>
	Off	Communication not established with transmitter. <i>Verify transmitter is turned on and operating and fiber properly connected.</i>
ENABLED	Green	Valid data format selected with DATA SELECT switch. <i>No action required.</i>
	Red	Test mode or invalid data format. <i>Check DATA SELECT switch conforms to desired configuration – may be valid.</i>
	Flashing Red/Green	DATA SELECT switch in Disabled position. <i>(Select a valid data format)</i>

Therefore, this can be used to determine the resting state of your equipment. Unique to the industry, the 9900V has special circuitry to capture data transitions and make them visible on the LEDs. High-speed bursts of activity, previously undetectable by standard LED circuits, can easily be seen by this special circuitry.

DATA OUT Indicator

The DATA OUT LED functions identically to the DATA IN LED except that the LED represents data that is being output from the unit. This LED has the same high-speed capture circuitry described in the DATA IN section.

LINK READY INDICATOR

This LED indicates the communication status between the receiver and the transmitter. A green LED indicates communication is established. When communication lost, this indicator will be off.

ENABLED Indicator

This LED has three states; green indicates a valid mode has been selected, red indicates an invalid mode (spare or test-mode) has been selected, or flashing red/green indicates that NO mode has been selected.

The 9900V units have an additional ENABLED LED on the rear panel as shown in Figures 2 through 5.

Test Mode

The test mode allows the end user to verify the operation of the data circuits in an 9900VMPD as well as the fiber connection from one 9900VMPD to another.

To execute the test mode:

1. Set the DATA SELECT switch SW1 on the 9900VMPD to be tested into position F (Test Mode). At this end only, wire the connector as shown in Table 12.
 - a. Connect the DATA IN+ pin to the DATA OUT+ pin.
 - b. Connect the DATA IN- pin to the DATA OUT- pin.
2. At the receiving (or opposite) end, set the DATA SELECT switch on the 9900VMPD to position 9.

In the test mode, the transmitting unit should behave as follows:

1. ENABLED LED is RED, indicating that a valid data format has not been selected.
2. DATA OUT LED is slowly flashing between amber, green, and off. This indicates that the test mode is generating an output pattern and sending it out on copper.
3. DATA IN LED should mimic the DATA OUT LED. This indicates a good, proper loopback connection, and proves that the data transmit/receive circuitry is working properly.
4. LEVEL/LOSS™ may be red or green - indicates received fiber signal strength.

The receiving unit (position 9) should behave as follows:

1. ENABLED LED is GREEN, since a valid data format is selected.
2. DATA OUT LED should slowly flash amber, green, off. This indicates that the fiber path from the unit set for Test mode is reliable.
3. DATA IN LED should be OFF, since there is no input copper connection made.
4. LEVEL/LOSS™ should be green to off (but not red), indicating that sufficient optical power is being received.

After the test has been performed at one end, swap switch positions and connectors to perform the test on the other end. If the test is successful, the copper-in-to-fiber-to-copper-out conversion is working in both directions.

OPERATION

9900V links operate automatically once installed and connected to an operating power source. Connect the power supply to an AC outlet using the detachable power cord provided with the unit

Refer to TEST MODE for details on how to execute the test mode. For descriptions of LED color codes and an explanation of how to diagnose system faults, refer to LED OPERATION and Table 13.

Customer Support

For assistance in installing, operating, maintaining, and troubleshooting this product, refer to this document and any other documentation provided. If you still have questions, please contact technical support during normal business hours (Monday through Friday, excluding holidays, between 6 a.m. and 5 p.m. Pacific Time).

GE Security

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